

yellow straw-colour, as in the nyala and situtunga. They have also a more distinct back ridge than in other kudu horns, and thereby again approximate to those of the two last-named species; while the bony cores have no ridge corresponding to that on the sheaths. The skull has a transverse diameter of $4\frac{1}{2}$ inches across the orbits, and a contour length of $15\frac{1}{2}$ inches, the corresponding dimensions in a skull of the typical species with horns of the same length being $5\frac{1}{2}$ inches and $14\frac{1}{2}$ inches.

The spotted kudu, as I have called the new species, is in great degree intermediate between other kudus and the situtunga and nyala. It agrees approximately in size with the typical kudu, but in horn-characters is to a certain extent intermediate between that species and the situtunga or nyala. In the presence of a white patch on the throat and a second on the chest it resembles the lesser kudu and situtunga, as it also does in the absence of a neck frill; but in its long, coarse, dark, and white-spotted coat it comes much nearer male situtungas and nyalas than to either of the striped kudus. The ears are rather narrower and more pointed than in the typical kudu.

I propose to name the species *Strepsiceros buxtoni*, reserving for future consideration the question whether this species does not render it advisable to merge the genus *Strepsiceros* in *Tragelaphus*. If that course were adopted, the typical kudu would become *Tragelaphus strepsiceros*, the lesser kudu *T. imberbis*, and the spotted kudu *T. buxtoni*.
R. LYDEKKER.

The Habits of Worms.

So little is known about the habits of worms that it seems desirable to place on record any new observation calculated to throw light on the subject. On September 17 I received from Mr. Edwards, curator of the Worcester Museum, a small tube containing about half a score of living worms. The letter which accompanied the tube informed me that the worms were found in a lavatory basin. It was assumed that they had found their way up through the waste-pipe, as none had been found when the plug was fixed in the bottom of the basin. The worms were taken in the morning when the plug was not inserted, and when the water had been very slowly dripping all night. They were found singly, but when placed in a tube coiled themselves into a ball, and were difficult to separate. Each worm was about three-quarters of an inch in length, possessed of red blood, and having five to eight setæ in each bundle. These features, together with the shape of the brain and spermathecae, show the species to be *Pachydriulus subterraneus*, Vejvodsky. It was first described in 1889, and on April 8, 1892, I received it from the late Dr. Plowright, of King's Lynn. This was the first British record; but it has since been found by Mr. Southern and myself in various parts of the British Isles. It was obtained by Prof. Vejvodsky from the underground waters of Lille and Prague, and has more than once been sent to me by irate persons who complained that it had been found in their drinking water.

Pachydriulus (*Lumbricillus*) belongs to the large and important order of enchytraeids, some of the species of which are parasitic upon plants, while others feed on decaying leaves and vegetable matter, and yet others live in the water. As I am preparing a monograph of British annelids for the Ray Society, I am exceedingly anxious to obtain information and materials for making the work complete, and shall be grateful if observers will submit specimens of annelids of all kinds for identification, together with observations of their habits.

HILDERIC FRIEND.

Swadlincote, Burton-on-Trent.

Erasmus Darwin on Flying Machines.

PROF. MELDOLA's reference to Erasmus Darwin's prophecy of flying machines (p. 370) omits the most remarkable proof, as it seems to me, of his insight into the future. The verses which he quotes are from Canto I., lines 289-96, of the "Botanic Garden"; on line 254

there is a note in which occurs the following passage (the italics are mine):—

"As the specific levity of air is too great for the support of great burthens by balloons, there seems no probable method of flying conveniently but by the power of steam, or some other explosive material, which another half-century may probably discover."

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ARTHUR PLATT.

CAUSAL GEOLOGY.¹

IN science there can be no orthodoxy, and consequently there are no heresies. Prof. Schwarz's book will be read and circulated, instead of being burnt as a danger to established modes of thought. It will bring, in consequence, a freshness to those who have repeated, year after year, the same explanations of phenomena in their courses of instruction. They will feel much like the humdrum banker, who thinks that he really understands his business, until his son takes him one evening to the theatre, and he meets for the first time with the ideal villains of finance. The planetesimal hypothesis of Chamberlin is held by the present author to enable "one to build up a system of geology without an appeal to the unknown and the unknowable" (p. v). "Unknowable" is a rash word; but there is a good deal more of the unknown than of the known in the explanations of earth-structure put forward by Prof. Schwarz. We remember a paper of his, in which the former boundaries of continents and oceans were ingeniously deduced from a rock-fragment discovered in a southern isle. The present work includes speculations of a similar order of magnitude, but the underlying facts are marshalled more strategically, and far bigger battalions are brought into the field.

The planetesimal hypothesis, as developed by Prof. Schwarz, leads him to the conception of a cold earth, steadily growing in bulk by the accretion of meteoritic, or, as he prefers to write it, meteoric matter. The phenomena of the surface cannot, then, be caused by shrinkage of the interior, nor can volcanic action be ascribed to general internal heat. Earth-movements (p. 189) are said to develop sufficient heat to vaporise water in the crustal layers affected by them; all this water has crept down by capillary action from the surface, and may form outbursts of steam, shattering the sedimentary rocks around the orifice. If the heat generated is sufficient to melt the sediments, the product, with the water in it, appears as an ordinary upwelling of lava.

From the author's point of view, all gneisses and granites are derived from sediments by metamorphism in dissolving waters, or by actual melting (pp. 40, 221, &c.). The ultrabasic vents of Kimberley and Pretoria, so well known as the diamond-pipes, contain "meteoric matter of the centrosphere" (p. 198), since here faulting was sufficiently profound to melt up the ferriferous masses that underlie the ordinary crust. The faulting is accounted for by the transference of sedimentary matter from one part of the surface to another, the overlaid rocks flowing away under the pressure; and we are given to understand that melting, with production of granite domes, or of lava ready to arise in fissures, takes place where water is present, and where the pressure is most intense, instead of where pressure is relieved. A fine instance of revivalism in geology appears on p. 227, where Prof. Schwarz, rejecting Darwin's observations in South Africa, and *lit par lit* injection generally, urges that "thin laminæ of granite substance bedded in between metamorphosed sediments" may result

¹ "Causal Geology." By Prof. E. H. L. Schwarz. Pp. viii+243. (London: Blackie and Son, Ltd., 1910.) Price 7s. 6d. net.

from the sediments "changing into granite in the ultimate expression of metamorphism."

It would be unfair, however, to judge the author's powers of observation from this or by his more startling propositions, such as that of the reconstitution of sand-grains on p. 140. The fact that he has seen so much throughout South Africa, in a country laid bare by nature for the geologist, entitles him to a serious hearing. The emphasis that he lays on the descent of ore-material from the surface (p. 11), and on the ascent of calcium carbonate from below, recalls at once the tropical rains, and the "pans" upon the desiccating surface. But surely, as Mr. Mennell has lately pointed out in his "Petrology," there is abundant evidence of the accumulation of iron-ores under African conditions at the surface. The whole siliceous crust, however, according to Prof. Schwarz, is a residue from the leaching-out and down-sinking of iron and magnesium from the primitive meteoritic matter. The silica was first set free from this matter in a colloidal form which consolidated as



Boulder in Dwyka Conglomerate, Prieska, illustrating lateral flow in rocks under pressure.
From "Causal Geology."

chert. Quartz arose only by metamorphic action in the depths (p. 39). When we are told that chert is not crystalline, and when we reflect on the quartz deposited in cavities from solution, as is the case in limestones which retain all their fossils, we cannot help thinking that our author's earlier studies have been temporarily overcast by a cloud of planetesimals. The careless writing of some sentences suggests that the work has been pushed forward with something of the heat of a new gospel. The word "meteorite" is thus missing in the middle of p. 10; cubes of salt are said to be present (p. 57) in the "bubbles in granitic quartz"; to most field-workers the Archæan masses (p. 69) cannot seem "characterised by the enormous development of limestone"; when carbon dioxide is included in an analysis of the air, the omission of argon and its allies can hardly be excused (p. 93) by their "minute proportions"; Fig. A, a lunar area, opposite p. 22, should surely be inverted to agree with its description; and, to come to smaller matters, grammar is imperfect on pp. 3, 131, 145, and 200.

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Yet we again and again respect Prof. Schwarz's grasp of geological literature, writing as he does in a small South African town, and his preface shows that he is still to be ranked among the inquirers, and not as the apostle of a dogma. Probably we also have been the gainers, if, after reading his well-printed and well-illustrated book, we feel that we know less than before concerning the constitution of the globe.

GRENVILLE A. J. COLE.

THE BRITISH SECTION OF THE BRUSSELS EXHIBITION.

THE importance of a Government department to deal with exhibitions could not have been better exemplified than when the King of the Belgians opened the new British section of the Brussels Exhibition on September 19. Exactly five weeks previously the section which had cost so much in thought, time, and money was reduced to a smoking mass of ruins. For a moment everyone was stunned by the

extent of the loss, but within a few hours it had been determined to rebuild the section provided the reply received from previous exhibitors was satisfactory. The replies were not only satisfactory, but almost overwhelming; in fact, more space was applied for than the Commission had at its disposal.

But the rebuilding of the section was only rendered possible by the Belgian Commission placing at the disposal of the British organisers the *Salle des Fêtes*. This building was originally used for holding large congresses and meetings, and had a platform and a sloping auditorium, the side alleys being divided up into reception and cloak rooms. All the internal fittings of this building have been removed, and it has been divided up into courts in a most artistic fashion, the various courts radiating out from a central transept.

The space of the original building was 150,600 square feet; the present space is only 35,500 feet; but this fact made it difficult rather than easy to design and fit up the new section, owing to the large number of exhibitors who desired space. How rare is it for an exhibition to be ready for the opening day, even after months have been spent in collecting the exhibits! But although the work was enormous, the new section arose from the ashes in the space of five weeks, and the whole exhibit, with the exception of one or two cases, was absolutely finished when the King of the Belgians opened it. Not only was the exhibit finished, but the new catalogue, "Catalogue Officiel de la nouvelle Section Britannique," was ready on the same day for distribution. Without the machinery of the committees organised by the Royal Commission of the Board of Trade it would, however, hardly have been possible to have accomplished this feat.

In declaring the new section open, and replying to Sir Arthur Harding, the King said: "Your Excellency has associated the British and Belgian people in the eulogy which you have made in such happy terms of the work of repairing the disaster caused by the fire. Certainly the Belgians have displayed in that work their fine qualities of courage and perseverance which no misfortune can daunt, and I congratulate them upon it highly. But what shall I say